

REMARKS

This is intended as a full and complete response to the Office Action dated September 26, 2007, having a shortened statutory period for response set to expire on December 26, 2007. Please reconsider the claims pending in the application for reasons discussed below.

Claims 23-48 remain pending in the application and are shown above. Claims 1-22 and 49-80 have been cancelled by Applicant. Claims 23-48 are rejected by the Examiner. Claims 23-48 have been amended to clarify the invention. Reconsideration of the rejected claims is requested for reasons presented below.

Restriction / Election

Applicant confirms the election to prosecute claims 1-48 provisionally made by B. Todd Patterson via a telephone conversation with the Examiner on September 10, 2007.

Claim Rejections – 35 U.S.C. § 102

Claims 1, 3, 4, 6 and 10 are rejected under 35 U.S.C. § 102(b) as being anticipated by *Kuthi et al.* (U.S. Patent No. 6,106,663).

Applicant has canceled claims 1-22.

Claim 23 is rejected under 35 U.S.C. § 102(e) as being anticipated by *Hamelin et al.* (U.S. Publ. No. 2006/0134919). Applicant respectfully traverses the rejection.

The Examiner asserts that *Hamelin et al.* disclose a distribution plate (430) (Fig. 9B) comprising a plurality of gas passages (446) passing between the upstream and downstream sides, wherein at least one of the gas passages has a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape, a coaxial conical shape (444) connected to the second cylindrical shape for the remaining length of the diffuser plate, with the upstream end of the conical portion having substantially the same diameter as the second cylindrical shape and the downstream end of the conical portion having a larger diameter.

Applicant has amended claim 23 to clarify the invention.

Hamelin et al. teach a chemical treatment chamber having a gas distribution assembly (440) with a first (430) and second (432) gas distribution plates coupled together. The first gas distribution plate (430) has a plurality of cylindrical apertures (446) of constant diameter, each extending from an upstream side of the gas distribution assembly (440) to communicate with a corresponding aperture (444) of second gas distribution plate (432). The apertures (444) extend from a first section of constant diameter to a section wherein the diameter tapers to a second section of constant diameter, smaller than the first. Therebelow, the second section flares with increasing diameter to a downstream side of the gas distribution assembly (440) (Figs. 9A,B). *Hamelin et al.* does not teach a gas distribution plate assembly for a plasma deposition chamber including a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber and an RF power source coupled to the diffuser plate.

Therefore, *Hamelin et al.* fail to teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages has a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in amended claim 23. Applicant requests withdrawal of this rejection.

Claim Rejections – 35 U.S.C. § 103

Claims 8 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kuthi et al.* (U.S. Patent No. 6,106,663) in view of *White et al.* (U.S. Publ. No. 2003/0066607). Claims 2, 5, 9 and 11 are rejected under 35 U.S.C. § 103(a) as being

unpatentable over *Kuthi et al.* (U.S. Patent No. 6,106,663). Claims 12-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Kuthi et al.* (U.S. Patent No. 6,106,663) in view of *White et al.* (U.S. Publ. No. 2003/0066607) and further in view of *Chinn et al.* (U.S. Publ. No. 2003/0124848).

Applicant has canceled claims 2-22.

Claims 23-31 and 35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Metzner et al.* (U.S. Patent No. 6,454,860). Applicant respectfully traverses the rejection.

The Examiner asserts that *Metzner et al.* disclose a processing system (100) (Fig. 2) having a processing chamber (200) comprising a diffuser plate (240) (Fig. 4) having an upstream side and a downstream side and a plurality of gas passages (238) passing between the upstream and downstream sides, wherein at least one of the gas passages (Fig. 9) has a first cylindrical shape (269) for a portion of its length extending from the upstream side, a second coaxial cylindrical shape (286) with a smaller diameter (287) connected to the first cylindrical shape, a coaxial conical shape connected to the second cylindrical shape for the remaining length of the diffuser plate, with the upstream end of the conical portion having substantially the same diameter (287) as the second cylindrical shape and the downstream end of the conical portion having a larger diameter (288).

Applicant respectfully submits that the Examiner errs in this assertion.

Metzner et al. teach a showerhead having a plurality of apertures extending from an upstream side to a downstream side of the showerhead. Each aperture has a first cylindrical section of constant diameter extending from the upstream side of the showerhead. Therebelow, the first cylindrical section tapers downwardly with a decreasing diameter to a second cylindrical section of a constant diameter, smaller than the diameter of the first section. The second cylindrical section extends downwardly and flares to a section of increasing diameter. Therebelow, a third cylindrical section of a constant diameter extends to the downstream side of the showerhead (Fig. 9). *Metzner et al.* does not teach a coaxial conical shape connected to the second cylindrical shape for the remaining length of the diffuser plate.

Therefore, *Metzner et al.* do not teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages has a first cylindrical shape for a portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a portion of its length, a coaxial conical shape connected to the second cylindrical shape for the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in amended claim 23 and amended claims 24-35 dependant thereon. Applicant requests withdrawal of these rejections.

Claims 32 and 34 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Metzner et al.* (U.S. Patent No. 6,454,860) in view of *White et al.* (U.S. Publ. No. 2003/0066607). Applicant respectfully traverses the rejection.

Metzner et al. are discussed above with regard to claim 23. *White et al.* do not remedy these deficiencies.

Therefore, *Metzner et al.* and *White et al.*, alone or in combination, do not teach, show, or suggest the gas distribution plate assembly of claim 23, wherein the diffuser plate is polygonal as recited in amended claim 32. Applicant requests withdrawal of this rejection.

Additionally, *Metzner et al.* and *White et al.*, alone or in combination, do not teach, show, or suggest the gas distribution plate assembly of claim 32, wherein the diffuser plate is rectangular as recited in claim 34. Applicant requests withdrawal of this rejection.

Claims 36-48 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Metzner et al.* (U.S. Patent No. 6,454,860) in view of *White et al.* (U.S. Publ. No. 2003/0066607) as discussed in claims 23-35 above and further in view of *Chinn et al.* (U.S. Publ. No. 2003/0124848. Applicant respectfully traverses the rejection.

The Examiner asserts that *Metzner et al.* and *White et al.* teach all of the elements and limitations of base claim 36 except a remote plasma source coupled to a fluorine source.

Applicant respectfully submits that the Examiner errs in this assertion.

Metzner et al. teach a showerhead having a plurality of apertures extending from an upstream side to a downstream side of the showerhead. Each aperture has a first cylindrical section of constant diameter extending from the upstream side of the showerhead. Therebelow, the first cylindrical section tapers downwardly with a decreasing diameter to a second cylindrical section of a constant diameter, smaller than the diameter of the first section. The second cylindrical section extends downwardly and flares to a section of increasing diameter. Therebelow, a third cylindrical section of a constant diameter extends to the downstream side of the showerhead (Fig. 9). *Metzner et al.* does not teach a coaxial conical shape connected to the second cylindrical shape for the remaining length of the diffuser plate.

White et al. teach a rectangular gas distribution plate for distributing a process gas in a chamber. *Chinn et al.* teach a fluorine source coupled to a remote plasma generator, further coupled to an etch chamber.

Therefore, *Metzner et al.*, *White et al.*, and *Chinn et al.*, alone or in combination, do not teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber that is coupled to a remote plasma source and the remote plasma source is coupled to a fluorine source, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages has a first cylindrical shape for a first portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a second portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in claim

amended claim 36 and amended claims 37-48 dependent thereon. Applicant requests withdrawal of these rejections.

Claim 36 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Hamelin et al.* (U.S. Publ. No. 2003/0134919) in view of *Chinn et al.* (U.S. Publ. No. 2003/012448). Applicant respectfully traverses the rejection.

Applicant has amended claim 36 to clarify the invention.

Hamelin et al. teach a chemical treatment chamber having a gas distribution assembly (440) with a first (430) and second (432) gas distribution plates coupled together. The first gas distribution plate (430) has a plurality of cylindrical apertures (446) of constant diameter, each extending from an upstream side of the gas distribution assembly (440) to communicate with a corresponding aperture (444) of second gas distribution plate (432). The apertures (444) extend from a first section of constant diameter to a section wherein the diameter tapers to a second section of constant diameter, smaller than the first. Therebelow, the second section flares with increasing diameter to a downstream side of the gas distribution assembly (440) (Fig. 9A,B). *Hamelin et al.* does not teach a gas distribution plate assembly for a plasma deposition chamber including a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber and an RF power source coupled to the diffuser plate.

Chinn et al. disclose a fluorine source coupled to a remote plasma generator, which is coupled to an etch chamber.

Therefore, *Hamelin et al.* and *Chinn et al.*, alone or in combination, do not teach, show, or suggest a gas distribution plate assembly for a plasma deposition chamber comprising a diffuser plate having an upstream side and a downstream side in the plasma deposition chamber that is coupled to a remote plasma source and the remote plasma source is coupled to a fluorine source, a plurality of gas passages passing between the upstream and downstream sides, wherein at least one of the gas passages has a first cylindrical shape for a first portion of its length extending from the upstream side, a second coaxial cylindrical shape with a smaller diameter connected to the first cylindrical shape and extending for a second portion of its length, a coaxial conical shape connected to the second cylindrical shape for the length of the remaining portion of the diffuser plate, with

the upstream end of the conical shape having substantially the same diameter as the second cylindrical shape and the downstream end of the conical shape having a larger diameter, and an RF power source coupled to the diffuser plate as recited in amended claim 36 and claims dependent thereon. Applicant requests withdrawal of this rejection.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this Office Action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,

By 

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